

Clarification Statement

We wish to clarify some points in relation to climate change and insect outbreaks based on a report published by the Colorado Forest Restoration Institute. The report "Recent Forest Insect Outbreaks and Fire Risk in Colorado Forests: A Brief Synthesis of Relevant Research" , was written by W.H. Romme, J. Clement, J. Hicke, D. Kulakowski, L.H. MacDonald, T.L. Schoennagel, and T.T. Veblen and published by the Colorado Forest Restoration Institute in 2006.

First, it has come to our attention that some believe that the report indicates that the bark beetle outbreaks across the American West do not constitute a crisis. While the report makes clear that from a purely ecological scientific perspective there is no evidence that the levels of bark beetle activity are unnaturally high, the report indicates that whether these outbreaks signify a "crisis" from a socio-economic perspective is a matter for society to decide.

Second, a complete reading of the report will indicate that there is a strong connection between the population levels of mountain pine beetles and other bark beetles, stand structure, host tree presence, and climate. As Dr. Tania Schoennagel (one of the authors of the report) points out: "The issue of scale is important to this discussion. The occurrence of mountain pine beetle-caused tree mortality in any particular stand or area of lodgepole pine is not unusual – the outbreak is a disturbance that can affect older stands of lodgepole pine under suitable climate conditions. However, the broad scale (across the range of lodgepole) and synchronous nature of current mountain pine beetle activity across the West may indeed reflect recent changes in climate conditions regionally (warmer winters and summers and the increased occurrence of drought)."

The authors also add that since publication of the report in 2006, there is increasing evidence of the widespread nature of today's outbreaks and the potential climate link. The synchronous occurrence of epidemics of different bark beetle species in many different forest types across western North America implies that the outbreaks are driven not just by local conditions (e.g., dense stands of trees) but also by environmental processes operating at a very broad scale. Because the climate is warming in most of western North America (where the outbreaks are occurring) and because we know that warmer conditions facilitate bark beetle outbreaks, it follows that climate change probably is at least partially responsible for the very extensive bark beetle outbreaks that we are seeing.

A considerable amount of research is being conducted to further explore these issues by research and academic institutions around the American West, including Colorado, and Colorado Forest Restoration Institute will continue to provide information as further reports and articles are published. You can find "Recent Forest Insect Outbreaks and Fire Risk in Colorado Forests: A Brief Synthesis of Relevant Research" on this website.

Additional recommended reading

Bentz B, Allen CD, Ayres M, Berg E, Carroll A, Hansen M, Hicke J, Joyce L, Logan J, McMahon J, Macfarlane J, Munson S, Negrón J, Paine T, Powell J, Raffa K, Régnière J, Reid M, Romme W, Seybold S, Six D, Tomback D, Vandygriff J, Veblen T, White M, Witcosky J, Wood D. (2009). "Bark Beetle Outbreaks in Western North America: Causes and Consequences". University of

Utah Press, ISBN 978-0-87480965-7. 42 p.

Raffa KF, Aukema BH, Bentz BJ, Carroll AL, Hicke JA, Turner MG, Romme WH (2008) "Cross-scale drivers of natural disturbances prone to anthropogenic amplification: The dynamics of bark beetle eruptions". *BioScience*, **58**, 501-517.

Bentz BJ, B. J., C. J. Fettig, E. M. Hansen, J. L. Hayes, J. Hicke, R. Kelsey, J. Lundquist, J. F. Negrón, R. Progar, J. Régnière, S. J. Seybold, and J. Vandygriff (2008) "Climate Change and Western Bark Beetles: Rapid Threat Assessment. Report to the Western Wildland Environmental Threat Assessment Center, USDA Forest Service". (http://www.fs.fed.us/wwetac/projects/PDFs/RTA_Bark_Beetle.pdf).